

# THERMAL ENERGY STORAGE SYSTEMS



<b>City &amp; organisation</b>	Helsinki, Aalto University
<b>Urban challenge(s) addressed</b>	Energy transition
<b>Name/title of learning practice</b>	Thermal Energy Storage Systems
<b>Type of case study</b>	Curricular/Life-long learning
<b>Programme level learning practice/ case study</b>	Local (city level)/ regional (between cities)/ national (country wide)

# BACKGROUND AND HISTORY

**Years of establishment:** 1.5 years

**Motivation behind intervention:** N/A

## **General content of intervention**

This course will be a challenge-based project course, where you will work in teams to solve a real-life challenge. On this course we will take holistic look on the future strategy on thermal energy flow control, including possible heat storage. This is not a topic for one particular discipline only and therefore we invite students from broad variety of backgrounds. We will have presentations from different disciplines from academia and industry.

**Target group:** Degree students/Adult learner.

**Length of the course:** 2 months.

**Average number of students attending:** 40

# URBAN CHALLENGES ADDRESSED AND THE CONTEXT

**Which urban challenge:** Energy transition

**Why was it addressed:** N/A

## **How is it addressed**

City of Helsinki has put forward a challenge competition to address the issue of carbon-based heating. Thermal energy storage systems course tasks student groups to coming up with a solution proposal for Helsinki Energy Challenge. Students received support during the course for coming up with their novel ideas about energy-transition in heating in Helsinki.

Two of the student teams ended up submitting their proposals to the Helsinki Energy Challenge.

# ORGANISATIONAL DESIGN

**Stakeholders involved:** N/A

**Resources required (human, capital, physical):** N/A

# LEARNING DESIGN

**ECTS:** 5

## Learning objectives

- Understand system level approach to thermal energy storage between Power plants, Industry, Community and building level.
- Can prepare fundamental heat and mass balances of thermal energy storages.
- Connect the need for thermal energy storage created by both RES-Electricity and RES-Heat
- Compare functioning of different energy storage technologies & materials.
- Able to characterize energy storage by technology, temperature, and timescale.

Apply thermal energy storages for a case study

## Training methodologies

- Contact sessions (speakers from different fields)
- Energy Platform event on 9.3 on “Decarbonising heat” which presented some inspiring concepts towards HEC
- Exercises
- Project challenge in student teams

## Format

- Teams of 5 work together and share the project work
- Utilize what they have learnt from the lectures
- Make a presentation on their solution and key results

**Student support systems:** N/A

**Assessment methods:** N/A

**Integration into curricula (if applicable) :** N/A

# HINDERS

## In relation to urban challenges

The readiness of the City to apply the proposals presented to them (remains to be seen)

**In relation to delivery of intervention:** N/A

# ENABLERS

## In relation to urban challenges:

- ◊ Students adapted well to the course being transferred online halfway through
- ◊ Relevance and applicability of given challenges to available educational expertise in HEI
- ◊ Wide audiences and real possibility for impact for student projects
- ◊ Variety of speakers giving their input and inspiration for the student groups

**In relation to delivery of intervention:** N/A

# REFLECTION

**Success factors:** N/A

**Outputs, outcomes and impact:** N/A

Lessons learned and recommendations

Addressing real-world challenges via prepping students for actual idea competition creates strong sense of purpose and good motivation in all participants. Courses that address the physical everyday environment of the participants create strong agency due to concreteness of tasks and ideas nurtured by them.

## **Other**

The efficiency of implementation still remains to be seen. Challenge course has however become popular among students and continues to address topical urban challenges through learning intervention.

**Note:** The information contained on this description was extracted from the "Case Study report" (published by the Urban GoodCamp consortium in March 2022), available at: [https://www.urbangoodcamp.eu/uploads/1/6/2/1/16214540/ucamp\\_-\\_case\\_study\\_report\\_1.pdf](https://www.urbangoodcamp.eu/uploads/1/6/2/1/16214540/ucamp_-_case_study_report_1.pdf)

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